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ABSTRACT

Developed for the industrial arts multifield laboratory program (junior high level), this curriculum guide provides the industrial arts teacher with a plan of organization for a one-year program of instruction based on seven units of instructional activities: metals, woods, plastics, drafting, electricity, power, and home repairs. Each unit lists the student behavior objectives and a schedule for instruction. This instructional schedule includes the content for each unit, presented in the form of task descriptions (manipulative, informational, and attitudinal), suggested instructor and student activities, and suggested resource materials (books and films which may not be available in each local situation). The appendix contains four organization patterns (each including instructional area, sequence, and duration) for the multifield laboratory. (JH)

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A Curriculum Guide for the Multifield Laboratory

Sponsored by the
Division of Vocational and Technical Education
Mississippi State Department of Education
Jackson, Mississippi

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PREFACE

Industrial arts should follow the multifield laboratory concept (composite general shop) the first time it is offered past the seventh grade level. In most school systems in Mississippi, this will take place at the eighth grade level. This decision was reached by a committee of industrial arts teachers and supervisors at a meeting held two years ago in Jackson. This committee had been charged with the responsibility of adopting a statewide, unified industrial arts program for grades seven through twelve.

That the committee reached this decision should come as no surprise to those familiar with the philosophy of industrial arts. Industrial arts at this level should be exploratory in nature and provide learning experiences to assist students in making informed and meaningful career choices. The multifield laboratory, exposing students to many different occupational areas, accomplishes this purpose.

Most of the material in this publication was adopted from a curriculum guide developed and used in the State of Idaho. Portions of their material have been changed to fit the format used by the R/CU. Other portions have been modified to conform to the industrial arts programs in Mississippi. Sincere appreciation is extended to the State Supervisor of Industrial Arts in Idaho for sharing this material.

Acknowledgement is also extended to Mr. Larry L. Godfrey, State Supervisor of Industrial Arts Education in Mississippi, for his valuable suggestions during the preparation of this publication.

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INSTRUCTIONAL PROCEDURES

This publication has been developed as a curriculum guide for the industrial arts multifield laboratory. This type of industrial arts program should be offered to students at the eighth grade level. If, however, industrial arts is not offered at the eighth grade level in a particular school district, but is offered for the first time at the ninth grade level, then the multifield concept should be used following this curriculum guide.

The major purpose of this curriculum guide is to provide the industrial arts instructor with a plan of organization and suggestions to strengthen the instructional program. It is not intended as a replacement for materials currently being used. Most of those materials can be used in this plan of organization.

This curriculum guide includes information in the areas of: Metals, Woods, Plastics, Drafting, Electricity, Power and Home Repairs. It is not suggested, or recommended, that all of these areas be included in a course spanning a time period of one school year. It is recommended that the teacher select at least four of the areas, based on laboratory facilities and equipment availability, and teach them simultaneously using the multifield concept. Using this concept, the class is divided into as many groups as areas offered, with each group rotating through the different areas. Four different patterns of organization are presented in Appendix A for the rotation of groups through the areas offered in the multifield laboratory. Teachers should study each organizational pattern carefully before selecting the one best suited for their local condition.

In examining the organizational patterns, the teacher will notice the Free Enterprise System included in three of them. Instruction in this subject, using the R/CU publication as a student text, has proved very popular with students at the eighth grade level. This should be undertaken as a class project: therefore, all groups are brought together for this activity.

The content for each area, which is listed in the Instructional Schedule, is presented in the form of Task Descriptions. A task contains learning content, includes a number of steps, and is essential to the completion of a major activity or project. Three types of tasks are included: (M) manipulative (operations), (I) informational (topics), and (A) attitudinal.

The Instructional Schedule also contains suggested instructor and student activities that may be used and followed to accomplish the listed tasks. Most of the suggested student activities can be accomplished through individual project instruction. Suggested resource materials are included which will assist in accomplishing the respective tasks and the activities.

Few industrial arts programs in Mississippi currently provide instruction in the area of home repair. With the increasing enrollments of girls in industrial arts, however, teachers may wish to include this as one of the areas in the multifield laboratory. Certainly this practical information will add value to the total program.

SUPPLEMENTARY INSTRUCTIONAL LEARNING AIDS

The Suggested Resource Material column in the Instructional Schedule section of this publication refers to books and films which may not be available in each local situation. Other books containing the same basic information can easily be substituted. The R/CU publication Resource Information for Industrial Arts contains a listing of 16mm loan films which are available to industrial arts teachers upon request. Make use of this service.

If the Free Enterprise System is included in the program, the R/CU publication Experiencing the Free Enterprise System through Industrial Arts should be used as a student text. If multiple copies of this text are not available, they can be secured from the Research and Curriculum Unit, Drawer DX, Mississippi State, MS 39762.

Those teachers desiring to add areas to their programs, but lack the tools or equipment required, will find Mississippi School Bulletin No. 147, entitled Mississippi Industrial Arts,to be most helpful. This bulletin contains a complete listing of the tools and equipment, along with specifications, needed for most of the areas included in this publication.

OBJECTIVES

The objective of this curriculum guide is to provide the industrial arts teacher with a plan of organization for a one year program in the multifield laboratory. This program will provide the students an

opportunity to:

Develop an insight and understanding of industry, its place in our society, and the free enterprise system;

Discover and develop individual talents, aptitudes, interests, and potentials as related to industry and technology;

Develop an understanding of industrial processes and the practical application of scientific principles;

Develop basic skills in the proper use of common industrial tools, materials, and processes;

Develop problem-solving and creative abilities involving the materials, processes, and products of industry;

Develop an understanding of industrial and technological career opportunities and their requirements and training availability.

Individual unit objectives appear at the beginning of each area included in this curriculum guide. These objectives state what the student should be able to do after completing the unit. For ease of identification, unit objectives have been printed on blue paper.

INTRODUCTION

It has long been recognized that industrial arts at the junior high school level should be exploratory in nature. For this to happen, students must be provided the opportunity to engage in and sample many different areas of work. The multifield laboratory concept offers the best arrangement to fulfill this exploratory role. This arrangement offers a wide range of activities to enable students to develop an understanding of industrial materials and processes and to explore individual aptitudes, interests, and aspirations.

For exploratory experiences to be of value, the industrial arts teacher must provide sound and meaningful career information to the students. It means little, for example, for a student to discover an aptitude and interest in drafting unless he/she also learns of the training requirements and training availability, along with information concerning job opportunities in that particular area of work. The teacher must make this kind of information available to the students throughout the course.

The multifield laboratory offers another advantage which should be mentioned. This type of organizational arrangement can be undertaken with a minimum amount of tools and equipment since only a small group of students will be working in any one area at a given time.

INSTRUCTIONAL ACTIVITIES

The instructional activities which follow in this publication consist of an instructional schedule for each unit. These schedules should be considered only as starting points. The teacher, after reviewing the objectives at the beginning of each unit, may want to add or delete objectives to fit his/her local situation.

As with any new material being used for the first time, the teacher may encounter some problems in adopting the instructional schedules to the time frame selected for each area. The experienced teacher will keep notes during the first year of use. Such notes will aid in adjusting the schedules during the second year.

UNIT 1: METALS

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting the instructor's requirements, should be able to:

1. Discuss the history and different developmental stages in metallurgy. (Tasks 1.1.1 to 1.1.3)

2. List and follow shop safety procedures. (Task 1.1.4)

3. Select and use the proper hand tools. (Tasks 1.2.1 to 1.2.5)

4. Identify and describe the types of metals; properly design, cut fasten and finish a sheet metal project. (Tasks 1.3.1 to 1.3.10)

5. Bend and assemble objects from wrought iron and apply finishing techniques. (Tasks 1.4.1 to 1.4.5)

6. Heat trace metal, forge metal and perform a tolerance test. (Tasks 1.5.1 to 1.5.5)

7. Identify cutting operations and accurately cut stock with metal cutting machines. (Tasks 1.6.1 to 1.6.4)

8. Describe drilling tools and clamp and drill holes on the drill press. (Tasks 1.6.5 to 1.6.7)

9. Demonstrate the proper grinding of metal. (Tasks 1.6.8 and 1.6.9)

10. Cut, drill, bore and finish stock on the lathe and construct a project. (Tasks 1.7.1 to 1.7.5)

11. Explain types and reasons for cleaning, sanding, priming and applying protective coating of metal surfaces. (Tasks 1.8.1 to 1.8.7)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metals — Suggested Length

Sub-Unit 1.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.1.1	Trace and describe history of metals	I	Lead a discussion on early man discovery and uses of metals	Participate in class discussion	
1.1.2	Identify and describe characteristics of alloys and how they are manufactured	I	Discussion: List and describe alloy properties and how metals are manufactured	Study alloy types. Samples	
1.1.3	Identify and explain properties of ferrous and nonferrous metals	I	Discuss different properties of nonferrous vs. ferrous metals	Identify metals using spark test	
1.1.4	Identify and list shop safety problems	I	Lecture on shop safety	Student take safety test - sign it	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metals (Cont'd) — Suggested Length

Sub-Unit 1.2 Hand Tools

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.2.1	List and explain the usage of metal hand tools for metal	I	Demonstrate proper use of hand tools		
1.2.2	Correctly layout, saw and file stock to shape	M	Demonstrate layout, sawing and filing techniques	Layout and shape metal	
1.2.3	Bend metals using appropriate equipment	M	Demonstrate metal bending	Perform a bending operation	
1.2.4	Describe ways of cutting with a cold chisel, hack saw and file	I	Demonstrate proper cutting techniques	Perform a cutting operation	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metals (Cont'd) — Suggested Length

Sub-Unit 1.3 Sheetmetal

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.3.1	Identify and list types of sheetmetal and how they are rolled	I	Lecture on sheetmetal uses - show samples	Examine samples Test	
1.3.2	List safety procedures in sheetmetal work	I	Discuss safety in working with sheet-metal and equipment	Take safety test - sign	
1.3.3	Design and draw a sheetmetal product	I	Show samples of types of projects made of sheetmetal	Design a project	
1.3.4	Cut out stock	M	Demonstrate different kinds of hand cutting devices. Example: combination shears, aviation shears	Using proper safety techniques, cut out product	
1.3.5	Form flaps, seams and hems		Demonstrate flaps, seams, hems used in sheetmetal construction	Perform forming technique	
1.3.6	List and identify cutting machines		Demonstrate different kinds of cutting machines. Example: squaring shears, notcher, bench shears	Perform an operation using cutting machines	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metals (Cont'd) — Suggested Length

Sub-Unit 1.3 Sheetmetal (Cont'd)

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.3.7	Identify forming equipment	I		Identify and list bending machines	Film or fieldtrip to show industrial forming
1.3.8	Form sheetmetal on bending equipment	M	Demonstrate bending methods and safety Demonstrate bar fold, box and pan, cornice break and slip form roller	Perform an operation using forming machines	
1.3.9	Identify fastening methods for sheetmetals and fasten project	I	Discuss types of fasteners and their uses	Quiz on fasteners Fasten project	NOTE: Soldering & spot welding covered under finishing book
1.3.10	Identify and describe finishing methods and finish product	I	Demonstrate preparation of surfaces, and finishing methods	List steps in preparing metals for finish	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metals (Cont'd) — Suggested Length

Sub-Unit 1.4 Wrought Iron

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.4.1	Identify safety practices	A	Discuss safety practices	Quiz on safety	
1.4.2	Demonstrate good design techniques	I	Lecture/demonstrate good design techniques	Observe sample projects	
1.4.3	Set up and use bending jigs	M	Demonstrate bending	Bend metal	
1.4.4	Assemble wrought iron exercise	M	Demonstrate riveting and fastening techniques	Rivet exercise	
1.4.5	Apply suitable finish	M	Demonstrate finishing techniques	Finish samples	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metals (Cont'd) — Suggested Length

Sub-Unit 1.5 Forging and Heat Treating

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.5.1	Identify and follow safety practices	A	Demonstrate safety	Quiz on safety	
1.5.2	Identify and describe forging and heat treating equipment	I	Demonstrate use of equipment	Quiz on equipment	
1.5.3	Forge metal	M	Demonstrate forging techniques	Perform a forming exercise on metal	
1.5.4	Heat treat metal	M	Demonstrate heat treating techniques	Perform a heat treat exercise	
1.5.5	Perform hardness tests	M	Demonstrate hardness tests	Observe and perform hardness test	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 1 Metal (Cont'd) — Suggested Length

Sub-Unit 1.6 Cutting, Drilling and Grinding

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.6.1	Identify metal machining processes	I	Lecture on machining process and safety	Quiz on machine processes	
1.6.2	Identify cutting equipment	M	Lecture on uses and safety in cutting metal	Perform a cutting operation	
1.6.3	Cut with abrasive wheel	M	Demonstrate abrasive cutting	Use cutting equipment available	
1.6.4	Cut with saws	M	Demonstrate band saw and power hacksaw	Perform an operation of machine cutting	
1.6.5	Identify and describe drills and bit	I	Lecture on types of drills, safety, and portable press	Quiz on proper use of drills and bits	
1.6.6	Identify clamping techniques	I	Demonstrate special clamping techniques using machine vise	Clamp irregular shaped metals in machine vise	
1.6.7	Perform a drilling operation	M	Demonstrate proper procedure in drilling holes in metal	Use drill press, selecting proper bits and speed Drill a hole	
1.6.8	Identify grinders	I	Lecture on types of grinders: portable pedistal, wet and dry	Quiz on grinders	Textbook
1.6.9	Grind Metal	M	Demonstrate proper techniques of grinding	Grind metals	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 1 Metal (Cont'd) Suggested Length

Sub-Unit 1.7 Lathe

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
1.7.1	Identify lathe parts and operations	I	Lecture on lathe parts and operation	Quiz on lathe parts and operation	
1.7.2	Identify safety problems		Lecture on safety	Quiz on safety	Filmstrip or overhead transparencies
1.7.3	Demonstrate lathe operations	M	Demonstrate selecting metals, and set up methods	Set up and turn a work piece to a given size using at least three operations	
1.7.4	Cut on lathe		Demonstrate cutting operations		
1.7.5	Drill and bore		Demonstrate boring and reaming		
1.7.6	Finish stocks on lathe		Demonstrate filing and sanding		

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Type: M - Manipulative I - Informational A - Attitudinal

UNIT 2: WOODS

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting instructor requirements, should be able to:

1. Identify and describe consumer knowledge factors of forest products, the lumbering industry and products, as well as the opportunities and requirements of the lumber industry job market. (Task 2.1.1 - 2.1.7)

2. Comprehend and follow accepted practices regarding health hazards in the lumbering industry and wood products industry as well as accident prevention in the industry. (Tasks 2.1.8 - 2.1.9)

3. Cut, shape and plane stock accurately with a plane, chisel, wood auger bit and twist drill to finish edges, ends and drill holes. (Task 2.2.1 - 2.2.4, 2.3.1 - 2.3.4)

4. Provided with appropriate tools, do spindle and faceplate turning on a lathe with accuracy and safety. (Tasks 2.4.1 - 2.4.3)

5. Accurately select proper wood stock for laminating, complete proper gluing techniques including correct clamping and assembly of joints. (Tasks 2.5.1 - 2.6.4)

6. Assembly of wood products with the use of doweling, screws, nails and/or brads and the use of nuts, bolts and washers. (Tasks 2.6.1 - 2.6.4)

7. Select and apply the correct abrasive for the job and apply stain, bleach, shellac, lacquer, varnish, penetrating finish, paint, enamel to meet pre-set standards. (Tasks 2.7.1 - 2.7.11)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods — Suggested Length

Sub-Unit 2.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.1.1	List and describe forest products	I	Discuss the different products derived from woods	List products made of wood	
2.1.2	List and explain steps in lumbering	I	Discuss the steps in lumbering from selecting the tree to the finished product	List the steps in lumbering	
2.1.3	Identify and define tree nomenclature	I	Discuss-differences, types, growth rings, hard & soft woods and parts of tree	Identify tree parts, conifer vs deciduous (broad-leaf vs needle)	
2.1.4	Identify occupational opportunities in the wood industry	I	Discuss occupational information	Make a job application for a wood related occupation	Occupational Outlook Hand Book
2.1.5	Explain use of the Dictionary	I	Lecture & demonstrate	Select one job and show results	Dictionary of Occupational Titles
2.1.6	List job market and employment possibilities	I	Introduce speaker & prepare questions	Give report on demand, pay, apprenticeship programs, etc.	Contractor, carpenter or other tradesman
2.1.7	Recognize and describe different woodworking machines	I	Prepare matching/or multiple choice test	Test, name and describe woodworking machines	Field trip

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods (Cont'd) — Suggested Length

Sub-Unit 2.1 Introduction (Cont'd)

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.1.8	Be aware of health hazards	A	Explain and demonstrate safety for lungs, eyes, fire and switches	List safety equipment location, example of possible injuries. Demonstrate safe use of tools and equipment	
2.1.9	Follow safety and shop rules	A	Lecture on proper & protective clothing	Test	Available films and posters

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods (Cont'd) — Suggested Length

Sub-Unit 2.2 Sawing Tools

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.2.1	Identify and list cutting tools	I	Provide tools	Identify and list individual tools	Cabinet Making and Millwork
2.2.2	Rip stock	M	Demonstrate steps to rip with handsaw	Student will rip stock with handsaw	"Basic Woodworking Handtools"
2.2.3	Crosscut stock	M	Demonstrate steps to crosscut with handsaw	Student will hand-saw to crosscut material	
2.2.4	Cut irregular shapes	M	Demonstrate tools and steps to saw irregular shapes	Student will saw an irregular shape with a handsaw	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods (Cont'd) — Suggested Length

Sub-Unit 2.3 Cutting Edge Tools

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.3.1	Plane stock on edge and end grain	M	Demonstrate methods to plane edge & end grain on wood block	Student will plane edge and end grain	
2.3.2	Chisel dado joint	M	Show how to lay-out a dado joint, show correct procedure for cuts and safety	Student will safely cut with chisel	
2.3.3	Bore a hole into stock with auger bit and a hole with twist drill	M	Show the use of the brace & bit & twist drill by the electric hand drill	Student will drill a hole with each drill	
2.3.4	Drill a series of holes using a speed bit	M	Demonstrate layout and steps in drilling	Student will drill a series of holes	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods (Cont'd) — Suggested Length

Sub-Unit 2.4 Machines

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.4.1	Shape two edges of sample board by use of sur-form file and two edges using a portable router	M	Demonstrate use of the sur-form file and the router	Student will shape a sample board with the two tools	
2.4.2	Turn spindle stock on a lathe	M	Demonstrate turning between centers & use of turning tools	Turn stock correctly	
2.4.3	Turn stock using face plate	M	Demonstrate fastening stock with face plate with correct length of wood screws	Turn stock with face plate	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Wood (Cont'd) — Suggested Length

Sub-Unit 2.5 Laminating

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.5.1	List and explain the advantages of laminating	I	Lecture and/or demonstration, prepare test	Read assignment take test	Films or other visual aids
2.5.2	Describe the proper selection of stock	I	Show samples	List properties of wood and list selection for project	
2.5.3	Glue material	M	Demonstrate gluing		
2.5.4	List the steps of laminating	I	Make matching test	Test	
2.5.5	Clamp stock	M	Demonstrate clamping	Laminate material	
2.5.6	Use proper joints on end grains	M	Lecture, demonstration, assignment	Make different end joints for lamination	Charts on joints

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods (Cont'd) — Suggested Length

Sub-Unit 2.6 Constructing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.6.1	Assemble stock with doweling	M	Discuss and demonstrate doweling techniques and layout	Perform an operation of dowel fitting	
2.6.2	Attach stock with screws	M	Discuss and demonstrate the setting of screws	Perform an operation utilizing screws	
2.6.3	Attach stock with a variety of nails and brads	M	Discuss and demonstrate correct usage of nails and brads	Perform an operation using nails and brads	
2.6.4	Attach stock using nuts, bolts and washers	M	Discuss and demonstrate the uses of bolts, washers, nuts	Perform an operation using bolts, nuts, and washers	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 2 Woods — Suggested Length

Sub-Unit 2.7 Finishing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
2.7.1	Identify and list types of abrasives and backing material	I	Prepare samples, lecture, prepare matching test	Report or test on materials used to make abrasives	Film strip
2.7.2	Prepare projects for sanding	M	Demonstration-checking for squareness and smoothness with a plane	Prepare article for sanding	
2.7.3	Sand stock	M	Demonstration	Sand material	
2.7.4	List steps in use and selection of stain	M	Demonstration with samples of stain	Stain material	
2.7.5	List the bleaching process	M	Show samples and procedure	Bleach material	
2.7.6	Apply a shellac finish	M	Demonstrate application of shellac	Use shellac on material	
2.7.7	Apply a lacquer base finish	M	Show application of lacquer	Apply lacquer to material	
2.7.8	Use a varnish on material	M	Demonstrate use of varnish	Apply varnish to material	
2.7.9	Use penetrating finish	M	Show use of penetrating finish on material	Apply penetrating finish on material	
2.7.10	Apply paint and enamel	M	Demonstrate application of paint and enamel	Use paint and enamel on material	
2.7.11	Select the proper finish for a project	I	Provide samples Explain selecting process of all finishes	Finish project	

Type: M - Manipulative I - Informational A - Attitudinal

UNIT 3: PLASTICS

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting instructor requirements, should be able to:

1. Trace the development of plastics, list main families, raw materials, general properties, uses and applications to consumer products. (Tasks 3.1.1 - 3.1.8)

2. Describe compression, injection, blow molding, extrusion molding, their materials and products and be able to run each machine. (Tasks 3.2.1 - 3.2.25)

3. Make a casting by various methods and describe the importance of each. (Tasks 3.3.1 - 3.3.10)

4. List principles involved in thermoforming, the role thermoforming plays in industry and make a product by the different methods. (Tasks 3.4.1 - 3.4.7)

5. Describe reinforcing materials, their uses, and lay-up a reinforced product using one of their uses and methods. (Tasks 3.5.1 - 3.5.3)

6. List the foaming process and make a foam product. (Tasks 3.6.1 - 3.6.11)

7. Describe cutting, shaping, fastening, coating, design and fabricate a product. (Tasks 3.7.1 - 3.7.11)

8. Research careers in industrial plastics and write a critique on a specific occupation. (Tasks 3.8.1 - 3.8.2)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 3 Plastics Suggested Length

Sub-Unit 3.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.1.1	Follow the development of plastics	I	Provide information sheets and/or transp.	Outline the history of plastics	Exploring the World of Plastics
3.1.2	List and describe the main groups of plastics	I	Prepare chart with groups and families	Name 2 groups and list families	The Story of the Plastics Industry
3.1.3	Match raw material with example of plastic	I	Provide samples and keys	List materials	
3.1.4	Define the general properties of plastics	I	Hand-out sheets and discussion	Follow discussion	
3.1.5	Identify future trends of the plastic industry	I	Issue information sheets of graphs	List future changes	
3.1.6	Explain advantages of buying plastics products	I	Provide discussion and show comparison		
3.1.7	State disadvantages of plastic products	I	Provide discussion		
3.1.8	Gain appreciation of plastic products	A			

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics (Cont'd) — Suggested Length

Sub-Unit 3.2 Molding

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.2.1	Describe compression and transfer molding	I	Show samples of molded products	Quiz	Exploring the World of Plastics
3.2.2	Describe the need for heat and pressure in molding	I	Review thermoplastic and thermosetting	Quiz	
3.2.3	Identify plastics used for compression molding	I	Provide samples of plastics	Study samples of plastics	
3.2.4	Describe how cold forming is a form of compression molding	I	Demonstration - cold forming		
3.2.5	Set up and prepare equipment used	M	Demonstrate machine operation	Select mold and material	
3.2.6	Mold a product	M		Check for errors and quality of product	
3.2.7	Trim product	M	Establish quality needed	Bring finished product up to specifications	
3.2.8	Describe mold types	I	Provide sample molds		Exploring the World of Plastics
3.2.9	Identify desired molding material	I	Show phenolic, urea and melamine samples	Quiz	
3.2.10	List safety rules	I	Post safety rules		
3.2.11	Set up injection machine	M	Demonstrate machine	Select desired mold, line up mold, lock and purge the machine	The Story of the Plastics Industry

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics (Cont'd) — Suggested Length

Sub-Unit 3.2 Molding (Cont'd)

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.2.12	Mold part/or product	M			
3.2.13	Trim parts to industrial standards	M	Provide desired product standards		
3.2.14	Appreciate good housekeeping	A			
3.2.15	Describe types of extruders	I	Show diagrams, pictures or filmstrips	Study unit and diagrams	Exploring the World of Plastics
3.2.16	List uses of extrusion molding	I	Have example of extruded products, use pictures if necessary	Quiz	Products from home, school, etc.
3.2.17	Explain procedures in blow molding	I			Exploring the World of Plastics
3.2.18	List products of blow molding	I	Show examples		
3.2.19	Name plastics used in blow molding	I	Show samples, explain why thermosets cannot be used	Quiz	
3.2.20	Set up and prepare machine	M	Demonstrate machine and safety	Select mold and stock load machine	
3.2.21	Mold a product	M	Observe student	Operate machine	
3.2.22	Cool and trim product	M		With knife or scissors remove flash	
3.2.23	Put material and machine away	M		Follow-up rules	
3.2.24	Sketch an acrylic laminate product	M	Show examples	Using design step make a design	Exploring the World of Plastics
3.2.25	Make an acrylic laminate	M	Demonstrate glue and procedure	Glue and assemble pieces	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 3 Plastics Suggested Length

Sub-Unit 3.3 Casting

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.3.1	Describe the importance of heat in plastisol casting	I	Lecture	Quiz	Exploring the World of Plastics
3.3.2	Make a casting using a dip mold	M	Demonstrate dip casting	Select a mold and complete a casting fol- the steps for plastisol	Plastics Technology
3.3.3	Make a casting using a slush mold	M	Demonstrate slush casting	Produce casting	Industrial Plastics
3.3.4	List the steps in casting polyester resin	I		Quiz	Pamphlets: "Safety Provisions and Practices"
3.3.5	Cast a polyester resin product	M	Demonstrate casting polyester resins	Select a mold and complete a casting following the steps in polyester resins	Mold Techniques and Mold Designs
3.3.6	List safety steps in casting	I		Quiz	
3.3.7	List the steps in single-axis rotational casting	I	Emphasize the importance of safety	Follow the safety steps closely in casting to prevent injury	
3.3.8	Cast a single-axis rotational product	I	Demonstrate casting a single-axis rotational product	Select a mold and complete a casting following the steps in single-axis rotational casting	
3.3.9	List the steps in two-axis rotational casting	I	Lecture	Quiz	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics (Cont'd) — Suggested Length

Sub-Unit 3.3 Casting (Cont'd)

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.3.10	Cast a two-axis rotational product	M	Demonstrate casting a two-axis rotational product	Select a mold and complete a casting following the steps in two-axis rotational casting	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics (Cont'd) — Suggested Length

Sub-Unit 3.4 Thermoforming

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.4.1	List scientific principles involved in the thermoforming process	I	Lecture using visual aids	Read-discuss	Exploring the World of Plastics
3.4.2	List types of plastics used for thermoforming	I	Provide samples with identification		Tool Companies: American Society for Testing Materials
3.4.3	Identify thermoformed products	I	Provide samples with identification	Observe at home	
3.4.4	Form a product	M	Demonstrate	Construct a project	
3.4.5	Demonstrate proper finishing techniques	M	Provide technical background with demonstration	Finish a project	
3.4.6	Recognize the importance of safety in handling tools and materials	A	Lecture & visual aids	Practice safety	
3.4.7	Identify types of thermoformed packaging	I	Provide samples and explanations	Observe in stores	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics (Cont'd) — Suggested Length

Sub-Unit 3.5 Reinforcing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.5.1	List material used for reinforcing	I	Lecture, handout/or assign study on reinforcing material	Quiz	Text: Exploring the World of Plastics
3.5.2	Specify applications of reinforcing	I	Demonstrate hand lay-up and matched molding	Test	Industrial Plastics
3.5.3	Identify areas where reinforcing is used	I	Lecture, handout/or assign study on products using reinforcing		

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 3 Plastics (Cont'd) Suggested Length

Sub-Unit 3.6 Foaming

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.6.1	Demonstrate knowledge of the principles involved in bead foaming	I	Provide technical information	Oral or written report	
3.6.2	Pre-expand polystrene expandable beads	M	Demonstrate	Expand beads	
3.6.3	Produce a bead foam	M	Demonstrate mold cars and procedure	Construct a project	
3.6.4	Identify products made of bead foam	I	Provide samples	Inspect samples & observe at home	
3.6.5	Explain the working principles of chemical foaming	I	Provide technical information	Refer to text	Exploring the World of Plastics
3.6.6	Identify products manufactured by foaming	I	Provide samples	Observe at home and in stores	
3.6.7	List uses of foam products	I	Visual aids/samples		
3.6.8	Identify finishing option for foam products	I	Demonstrate	Observe	
3.6.9	Produce a rigid foam product	M	Provide materials	Construct a project	
3.6.10	Product a flexible foam product	M	Demonstrate/assist	Construct a project	
3.6.11	Demonstrate safe working practices in working with tools and materials	A	Visual aids/lecture	Follow safety rules	Text Tool Companies Printing Companies

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics (Cont'd) — Suggested Length

Sub-Unit 3.7 Fabricating and Finishing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.7.1	List the processes and tools inherent in cutting plastics	I	Prepare transparencies or information sheets	Make a list to be checked	Exploring the World of Plastics
3.7.2	Describe shaping of plastics	I	List materials found at home	Quiz	
3.7.3	Identify mechanical fasteners	I	Issue information sheets and a matching test		The Story of the Plastics Industry
3.7.4	Explain operations of sanding and buffing	I	Demonstrate sanding and buffing		
3.7.5	Define: Adhesion, cohesion, fusion	I	Lecture & demonstrate	Test	
3.7.6	List adhesives & plastic it is	I	Prepare transparencies	List	
3.7.7	List cohesives	I	Prepare transparencies	List	
3.7.8	Design product	M	Show examples	Design product	
3.7.9	Fabricate a product	M		Fabricate product	
3.7.10	Review methods of coating plastic	I	Prepare information sheets	List coatings	
3.7.11	List samples of plastic resin paints & varnishes	I	Prepare information sheets and samples	Give listing	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 3 Plastics — Suggested Length

Sub-Unit 3.8 Careers

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
3.8.1	Research careers in industrial plastics	I	Provide guidelines & procedures for researching list of sources	Interview personnel involved in plastics industry	Occupational Outlook Handbook
				Visit businesses involved in plastics work	"Modern Plastics Magazine"
				Read current plastic periodicals	Dictionary of Occupational Titles
				Write letters of inquiry	
3.8.2	Write critique on specific occupation	I	Furnish outline procedure	Write a specific occupational outline	

Type: M - Manipulative I - Informational A - Attitudinal

UNIT 4: DRAFTING

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting instructor requirements, should be able to:

1. Trace the development of drafting as used in industrial processes. (Task 4.1.1)

2. Identify aspects of good design. (Task 4.1.2)

3. List drawing occupations. (Task 4.1.3)

4. Identify and demonstrate the use of drafting tools and equipment. (Task 4.2.3)

5. Explain the uses of geometric construction. (Task 4.4.1)

6. List the methods used to divide a line into equal parts. (Task 4.4.2)

7. Divide a line into equal parts, bisect an angle, draw a hexagon, octagon, and an ellipse. (Tasks 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.4.7)

8. Demonstrate the construction and application of the alphabet of lines and lettering techniques. (Tasks 4.3.1, 4.3.2, 4.3.4)

9. Explain use of sketches and sketch a given object. (Task 4.6.1, 4.6.2)

10. Complete a perspective drawing and a pictorial drawing incorporating circles, arcs, and vertical, horizontal and incline lines. (Tasks 4.6.3, 4.6.4, 4.6.5)

11. Explain uses of orthographic projection drawings. (Task 4.5.1)

12. Correctly construct a multiview drawing and include dimensions. (Tasks 4.5.2, 4.5.3)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 4 Drafting — Suggested Length

Sub-Unit 4.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
4.1.1	Follow the development of drafting as used in industry	I	Lecture	Write a paper covering the history of drafting	Elements of Industries
4.1.2	Identify aspects of good design	I	Provide samples Provide pictures	Quiz	Exploring the Industries Communication
4.1.3	List drawing occupations	I	Explain use of Dictionary of Occupational Titles also, Occupational Outlook Handbook	From the D.O.T. list jobs relating to drafting	Drafting General Industry
				From the Occupational Handbook give the information provided pertaining to a specific occupation	General Industrial Education Dictionary of Occupational Titles Occupational Outlook Handbook Handouts

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 4 Drafting (Cont'd) Suggested Length

Sub-Unit 4.2 Tools and Equipment

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
4.2.1	Match the hardness of a pencil with its use	I	Discuss the different drawing pencils	List the different pencils	
4.2.2	Identify the different drawing papers and describe their uses	I	Discuss the different drawing papers	Quiz	
4.2.3	Identify and use the drafting tools provided	M	Demonstrate	Do drawing exercises using basic tools	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 4 Drafting (Cont'd) — Suggested Length

Sub-Unit 4.3 Lines and lettering

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
4.3.1	Describe and use application of alphabet of lines	M	Demonstrate and discuss alphabet of lines	Do an exercise using alphabet of lines	
4.3.2	Identify styles of lettering	I	Demonstrate and discuss lettering techniques	Quiz	
4.3.3	Letter a drawing	M	Discuss lettering application	Do exercise in lettering	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 4 Drafting (Cont'd) — Suggested Length

Sub-Unit 4.4 Geometrical Construction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
4.4.1	Explain the use of geometric construction	I	Lecture	Quiz on geometrical construction	
4.4.2	List the methods used to divide a line into equal parts	I	Lecture	Quiz on dividing	Transparencies from 3M
4.4.3	Divide a line into equal parts	M	Demonstrate	Divide a series of lines into two equal parts	
4.4.4	Bisect an angle	M	Demonstrate	Bisect a series of angles	
4.4.5	Draw a hexagon	M	Lecture and demonstrate	Draw a hexagon	
4.4.6	Draw an octagon	M	Lecture and demonstrate	Draw an octagon	
4.4.7	Draw an ellipse	M	Lecture and demonstrate	Draw an ellipse	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 4 Drafting (Cont'd) — Suggested Length

Sub-Unit 4.5 Orthographic Projection

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
4.5.1	Explain uses of orthographic projection drawings	I	Lecture	Quiz	
4.5.2	Draw a multiview drawing	M	Present samples and lecture	Draw at least one of the assigned drawings	
4.5.3	Dimension an orthographic drawing	M	Demonstrate and discuss application of dimensioning	Dimension at least one of the assigned drawings	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 4 Drafting (Cont'd) — Suggested Length

Sub-Unit 4.6 Sketching and Pictorials

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
4.6.1	Identify importance of sketching and pictorial drawing	A	Discuss use and importance of sketching and pictorials		
4.6.2	Sketch an object as provided	M	Discuss sketching techniques Provide objects to be sketched	Perform a task using sketching techniques	
4.6.3	Draw pictorial drawings	M	Discuss pictorial drawings	Make a pictorial drawing	
4.6.4	Identify vertical, horizontal inclines, lines, circles and arcs	I	Discuss vertical, horizontal, circles and arcs	Quiz on the use of arcs, circles horizontal and vertical lines	
4.6.5	Identify and draw a perspective drawing	M	Discuss and demonstrate proper perspective techniques	Draw a problem using perspective	

Type: M - Manipulative I - Informational A - Attitudinal

UNIT 5: ELECTRICITY

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting instructor requirements, should be able to:

1. Show appreciation of the impact of electricity on our society and vast employment opportunities. (Tasks 5.1.1, 5.1.3, 5.1.4)

2. Show respect for the power of electricity and think of safety first when working with it. (Task 5.1.2)

3. Develop an understanding of the importance, types and the basic need of magnetism to generate electrical energy. (Tasks 5.2.1 to 5.2.4)

4. Explain the electron theory, how to harness power in different currents and flow in cycles. (Tasks 5.3.1 to 5.3.7)

5. Test and hook-up wet and/or dry cell batteries into circuits. (Tasks 5.4.1 to 5.4.9)

6. List types of materials used as conductors and insulators. (Tasks 5.5.1 to 5.5.3)

7. Construct three splices and one solderless splice. (Tasks 5.5.4 and 5.5.5)

8. Explain flourescent, incandescent lighting and the importance of resistance in the circuit. (Tasks 5.6.1 to 5.6.7)

9. Follow automotive wiring in both primary and secondary circuits. (Tasks 5.7.1, 5.7.2)

10. Explain the functions of the alternator and the fuse panel. (Tasks 5.7.3, 5.7.4)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 5 Electricity Suggested Length

Sub-Unit 5.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.1.1	Follow the historical advancement of electricity	I	Discuss historic developments of electricity	Write a report on the history of electricity	Tests: Elements of American Industries
5.1.2	Identify safety problems in the electricity area	I	Discuss safety practices for electricity	Take a written safety test and sign it	Exploring the Industries
5.1.3	Research consumer knowledge of products	I	Discuss consumer knowledge	Test on consumer knowledge	Electricity & Electronics
5.1.4	List occupations related to electricity	I	Discuss electrical occupations	Visit an electrician	General Industrial Education
5.1.5	List the functions of electricity	I	Discuss the functions of electricity	Test on the functions of electricity	General Industry

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 5 Electricity — Suggested Length

Sub-Unit 5.2 Magnetism and Electromagnetism

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.2.1	Define natural magnetism	I	Lecture about magnetism	Do a research paper on magnetism	General Industry
5.2.2	Define electromagnetism	I	Demonstrate electro-magnetism	Give a report	
5.2.3	Identify and list the difference between the permanent, temporary and electromagnets	I	Lecture and demon-strate permanent and electromagnets and major differences	Compare differences between permanent and electromagnets	
5.2.4	List use of types of magnets in industry	I	Lecture about indus-trial uses of magnets	Quiz on industrial uses of magnets	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 5 Electricity — Suggested Length

Sub-Unit 5.3 Forms and Effects of Electricity

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.3.1	Produce static electricity	M	Demonstrate	Produce static electricity	
5.3.2	Construct a model showing the electron theory	M	Lecture on structure of atom and flow of electrons	Construct a model of an atom w/silicon balls	
5.3.3	State the differences between the two types of electrical current	I	Explain characteristics of D.C. and A.C. current	Name A.C. and D.C. appliances in homes	
5.3.4	List and describe the sources of direct current	I	Lecture	Quiz	
5.3.5	List and describe the sources of alternating current	I	Lecture	Quiz	
5.3.6	State the meaning of cycle	I	Draw a sine curve and explain cycle of electrical flow	Test	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 5 Electricity Suggested Length

Sub-Unit 5.4 Sources

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.4.1	Identify battery types	I	Lecture on the dry and wet types of batteries	Give examples where different types of batteries are used	General Industry
5.4.2	List and describe the components of a simple cell	I	Cut a battery in half and explain	Quiz	
5.4.3	Identify different material in batteries	I	Draw a battery and indicate parts, list types of materials	Identify all parts and types of materials	
5.4.4	Connect dry cell batteries in series	M	Demonstration	Wire a series circuit	
5.4.5	Connect dry cell batteries in parallel	M	Demonstration	Wire a parallel circuit	
5.4.6	Describe purposes of connecting batteries in series and parallel	I	Lecture on advantages and disadvantages of both types of circuits	Report	
5.4.7	Identify the functions of a secondary cell	I	Use references	Quiz	
5.4.8	Test the condition of a battery using a hydrometer	M	Explain chemical reaction in each cell	Use a hydrometer and test a battery	
5.4.9	Identify the principles used in generators and transformers	I	Lecture	Quiz and/or diagram	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 5 Electricity — Suggested Length

Sub-Unit 5.5 Conductors and Insulators

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.5.1	List and identify good conductors of electricity	I	Lecture on wire, sea water, etc.	Name conductors and describe	General Industry
5.5.2	List and explain effective electrical insulators	I	Exhibit electrical insulators	Name insulators and state purposes	
5.5.3	Identify the uses of the brown and sharp American gage	I	Demonstrate measuring wire sizes	Measure sample wires with gage	
5.5.4	Make three splices	M	Demonstrate	Construct 3 splices	
5.5.5	Make a splice using solderless connectors	M	Demonstrate	Splice with solderless connector	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 5 Electricity (Cont'd) — Suggested Length _____

Sub-Unit 5.6 Lighting and Heating

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.6.1	Describe lighting fixtures	I	Describe differences incandescent and flourescent fixtures, filaments, inert gas and vacuum	Report	General Industry
5.6.2	Describe the principle of a light bulb	I	Lecture	Sketch bulb and label parts	
5.6.3	Describe metering of electricity	I	Refer to James Watts and his formula of horsepower	Identify wattages on appliances, show total kilowatts	
5.6.4	Wire a lamp	M	Demonstrate	Wire a lamp	
5.6.5	Identify the principles involved in using electricity as a heat source	I	Lecture on Ohms' Law	Quiz	
5.6.6	Identify and describe characteristics of wire of heating elements	I	Lecture on the characteristics of nichrome wire	List equipment containing nichrome wire and report	Electricity and Electronics
5.6.7	Apply Ohms Law in figuring wattages, resistances, etc.	I	Lecture	Test	

Type M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 5 Electricity (Cont'd) — Suggested Length

Sub-Unit 5.7 Auto Electricity

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
5.7.1	Trace an automotive electrical lighting system	M	Graph system	Diagram and wire a simple lighting system	General Industrial Education
5.7.2	Trace the automotive ignition system	I	Diagram an ignition system	Follow in order and check the spark through the ignition, diagram	
5.7.3	Identify the use of the alternator	I	Demonstrate	Diagram system	
5.7.4	Identify the use of fuses in an electrical system	I	Discuss and demonstrate the use of fuses in an electrical system	Test	

Type: M - Manipulative I - Informational A - Attitudinal

UNIT 6: POWER

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting instructor requirements, should be able to:

1. Explain the natural sources of energy, its conversion into power harnessed by man, and measured in horsepower. (Tasks 6.1.1 to 6.1.3)

2. Describe the job market outlook on the job market. (Task 6.1.4)

3. Explain the differences of external and internal combustion engines. (Tasks 6.2.1, 6.2.3)

4. Identify two, four cycle and diesel engines and explain their specific fuel requirements and flow into the combustion chambers. (Tasks 6.2.4, 6.2.5)

5. Describe maintenance tools and apply correctly in performing maintenance jobs. (Tasks 6.3.1 to 6.3.8)

6. Measure torque, pressure, gauge and R.P.M.s to insure safe operation of the engine. (Tasks 6.3.9 to 6.3.12)

7. Service and replace worn out parts of the engine, test the ignition system and adjust carburetor for smooth running condition. (Tasks 6.4.1 to 6.4.5)

8. Select the proper types of oils for different locations, reasons and purposes. (Tasks 6.4.6 to 6.4.8)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 6 Power — Suggested Length

Sub-Unit 6.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
6.1.1	Explain sources of natural energy	I	Give examples	Construct sample of windmill, water wheel	Texts: Exploring Careers in Industry
6.1.2	Explain the different stages of the development of power	I	Give some historical facts of man's applications	Test on industrial revolution	General Industrial Education
6.1.3	Apply the formula of horsepower to a given engine specification	I	Refer to James Watt's formula and give example	Figure H.P. and displacement of your vehicle	
6.1.4	Identify job outlooks in the fields of recreation, maintenance and lumbering	I	Provide students with awareness of the demand of good small engine mechanics	List types of jobs, tools, recreational and individual vehicles which are connected with small engines	
6.1.5	Observe shop safety and proper tool and machine handling	A	Point out location of fire extinguisher, main switch, etc., in shop. Demonstrate safety devices	Draw floor plan and show equipment. Hands-on test on tools and machines	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 6 Power (Cont'd) Suggested Length

Sub-Unit 6.2 External and Internal Combustion Engines

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
6.2.1	Describe mechanics of external combustion engines	I	Demonstrate on cut-away engine	Sketch engine Label parts	See page 6.1
6.2.2	Point out the difference between external and internal combustion	I	Make chart and explain flow of fuels in both types of engines	Compare types and give examples of application advantage of internal combustion engine	
6.2.3	Disassemble and identify parts of a 2-cycle engine	M	Work with cut-away identifying parts and functions	Bring small engine from home, labeling and sketching parts	All About Small Engines
6.2.4	Describe the functions of a 4-cycle engine	I	Work with cut-away identifying parts and function	Name strokes and valve positions	
6.2.5	Describe types and mistures of fuels for 2-cycle, 4-cycle and diesel engines	I	Refer to refining process of fuels. Explain proportion and why mix is used in 2-cycle engines	Test	
6.2.6	Compare conventional carburetors with fuel injectors	I	Lecture on absence of carburetor on diesel engines	List advantages and disadvantages of carburetors. List advantages and disadvantages of fuel injectors	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

*Unit 6 Power (Cont'd) — Suggested Length

Sub-Unit 6.3 Tools and Testing Equipment

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
6.3.1	Identify and explain usage of special maintenance tools	I	Emphasize proper handling	Observation	
6.3.2	Remove flywheel with wheel-puller	M	Demonstrate	Apply wheelpuller to demonstrator engine	
6.3.3	Compress valves with valve spring compressor	M	Demonstrate	Practice with spring compressor on demonstrator engine	
6.3.4	Remove rings with piston ring expander	M	Demonstrate	Using engine brought from home remove rings	
6.3.5	Work with honing tool to break glaze on cylinder walls	M	Demonstrate and draw criss-cross pattern of cylinder wall after honing	If rings need replacing, hone engine brought from home	
6.3.6	Employ valve grinding tool to reset valves	M	Demonstrate	Grind and reset old valves	
6.3.7	Clean grooves with piston ring groove scraper	M	Demonstrate	Work on old pistons with groove cleaner	
6.3.8	Compress rings with piston ring compressor	M	Demonstrate compressing rings on piston	Using ring compressor compress rings on piston	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 6 Power (Cont'd) — Suggested Length

Sub-Unit 6.3 Tools and Testing Equipment (Cont'd)

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
6.3.9	Test compression with compression tester	M	Demonstrate. Explain chart which shows specified pressure rate for individual engine	Apply tester to check compression on your engine	
6.3.10	Set head and flywheel bolts with torque wrench	M	Demonstrate and refer to foot/pound and inch/pound wrenches	Torque head bolts on demonstration engine	
6.3.11	Read proper engine revolution with r.p.m. meter	I	Demonstrate and explain function of meter	Start up engine and test	
6.3.12	Demonstrate and emphasize the accurate usage of the feeler gauge	M	Demonstrate and hands-on test	Bring old spark plugs, clean and adjust to given gap	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 6 Power (Cont'd) — Suggested Length

Sub-Unit 6.4 Maintenance and Servicing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
6.4.1	Remove head to check valves	M	Lecture on causes of carbon deposits	Use micrometer and measure layer of deposit on old piston and valves	
6.4.2	Replace rings in proper sequence	M	Explain function of different types of rings	Identify given rings	
6.4.3	Explain valve grinding process	I	Show types of abrasives to be used	Hands-on test: reset valve and gap spacing between stem and tappet	
6.4.4	Cut new head gasket before reassembly	M	Demonstrate forming with ball peen hammer	Cut gasket	
6.4.5	Inspect carburetor needle, float, diaphragm and gas line for proper flow of gas	I	Compare the various types of carburetors	Test: Label parts of carburetor	
6.4.6	Test plug coil and condenser to insure good ignition	M	Work with ignition tester. Explain microfarads	Check out ignition of your lawn mower and replace points	All About Small Gas Engines
6.4.7	Describe importance of winterizing engines	I	Explain why to drain all gas in tankline and carburetor	Give information on starting troubles with engines stored for long periods	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 6 Power (Cont'd) — Suggested Length

Sub-Unit 6.4 Maintenance and Service

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
6.4.7	Explain various types of oils required for different locations and seasons	I	Lecture on importance of right lubrication and oil level	Bring empty, one quart oil can and explain abbreviations on label	
6.4.8	Demonstrate the cleaning of dry and oil base air filters	M	Stress need for cleaning regularly, relate to carburation and clean performance	Soak used foam filter in clean solvent and check pollution in liquid. Drain dirty oil from air filter through filter paper and observe residue	

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Type: M - Manipulative I - Informational A - Attitudinal

UNIT 7: HOME REPAIR

UNIT OBJECTIVES

Following the completion of the listed unit tasks and the suggested student activities, the student, meeting instructor requirements, should be able to:

1. List and identify maintenance problems, skills and safety procedures found in home maintenance. (Tasks 7.1.1 to 7.1.4)

2. Provided with materials and equipment, identify, list and install fixtures in service areas. (Tasks 7.2.1, 7.2.2, 7 2.3, 7.2.4, 7.2.6, 7.2.7, 7.2.8)

3. Provided with materials and equipment, test 110 Volt and 220 Volt circuits. (Task 7.2.5)

4. Identify waterflow problems and adjust water flow. (Tasks 7.3.1, 7.3.7)

5. Repair plumbing fixtures. (Tasks 7.3.2 to 7.3.6, 7.3.8, 7.3.9)

6. Provided with materials and equipment, cut, fit and glaze a window. (Tasks 7.4.1, 7.4.6)

7. Adjust and repair broken sashes, windows, shades. Remove and replace a window. (Tasks 7.4.1, 7.4.4)

8. Identify and list problems of door adjustment. (Tasks 7.5.1, 7.5.3, 7.5.4, 7.5.6)

9. Repair a screen, lock and latch. (Tasks 7.5.2, 7.5.5, 7.5.7)

10. Identify and list wall patch in materials and fasteners. (Tasks 7.6.1, 7.6.5)

11. Repair sheetrock wall paper, and hang paneling. (Tasks 7.6.2 to 7.6.4)

12. Identify and list steps in roof leak detection. (Tasks 7.7.1 to 7.7.5)

13. Repair an asphalt, composition, ceramic and wood shingle roof. (Tasks 7.7.6 to 7.7.9)

14. Identify and list types of adhesives. (Task 7.7.10)

15. Refinish a project. (Tasks 7.8.1 to 7.8.5)

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair — Suggested Length

Sub-Unit 7.1 Introduction

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.1.1	List areas of home repair	I	Lead discussion	Participate in discussion	General Industrial Basic Home Repair
7.1.2	Identify tools required in home repair	I	Explain and demonstrate	Identify operations using tools	
7.1.3	Identify maintenance problems	I	Discuss types of problems	Identify problems	Basic Home Repairs
7.1.4	Identify safety hazards found in the home	I	Discussion, test, sign	Take safety test and sign	
7.1.5	Interview building maintenance person	I	Discuss interviewing and job opportunities	Fill out a job application	

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Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) — Suggested Length

Sub-Unit 7.2 Electrical

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.2.1	Identify the parts of a service entry	I	Discuss service entries	Test	
7.2.2	Test and replace fuses	M	Discuss fuses	Test and replace a fuse	
7.2.3	Replace wall switches, and convenience outlets	M	Explain switches and outlets	Test and replace switches and outlets	
7.2.4	Replace plugs	M	Demonstrate plug replacement	Replace a plug	
7.2.5	Test 110 volt and 220 volt systems	M	Demonstrate testing 110 and 220 volt systems	Test 110 and 220 volt systems	
7.2.6	Identify and repair problems in wall and ceiling fixtures and doorbells	M	Discuss fixtures	Replace a fixture	
7.2.7	Replace flourescent light faulty components	M	Demonstrate replacement procedures	Replace components	
7.2.8	Identify electrical code specifications	I	Discuss code	Test on code	
7.2.9	Splice and repair electrical cords	M	Demonstrate repairing cord	Repair cord	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) — Suggested Length

Sub-Unit 7.3 Plumbing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.3.1	Identify water flow problems	I	Discuss water flow problems	Quiz on problems	
7.3.2	Repair a leaky pipe	M	Demonstrate pipe repair	Repair a pipe	
7.3.3	Repair a leaky faucet	M	Demonstrate and repair faucet	Repair a faucet	
7.3.4	List water heater problems	I	Discuss water heaters	Quiz on water heaters	
7.3.5	List toilet problems	I	Discuss toilet repair	Quiz	
7.3.6	Identify and describe pipes and fitting	I	Discuss fittings and and pipe	Quiz on fitting and pipes	
7.3.7	Adjust high and low water pressure	M	Discuss pressure adjustment	Adjust water on pressure valve	
7.3.8	Clear a blocked drain	M	Discuss blocked drains	Clear a blocked drain	
7.3.9	Identify defects in bathroom fixtures	I	Demonstrate crack repairing	Text	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) — Suggested Length

Sub-Unit 7.4 Windows

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.4.1	Adjust a double hung window sash	M	Demonstrate window adjustment	Adjust a window	
7.4.2	Free a sticking window	M	Demonstrate	Free a stuck window	
7.4.3	Repair a broken shade	M	Demonstrate and repair a broken shade	Repair a broken shade	
7.4.4	Cut glass for window	M	Demonstrate cutting glass	Cut glass	
7.4.5	Reglaze a window	M	Discuss window glazing	Glaze a window	
7.4.6	Remove and replace a sliding glass window	M	Demonstrate replacement and glazing window		

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) Suggested Length

Sub-Unit 7.5 Doors

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.5.1	Identify reasons for door sticking	I	Discuss door sticking problems	Test	
7.5.2	Repair a door latch	M	Demonstrate replacement of latch	Replace a latch	
7.5.3	List methods used in straightening warped doors	I	Discuss methods	Quiz	
7.5.4	List steps in hanging a door	M	Discuss and demonstrate door replacement	Hang a door	
7.5.5	Adjust or replace a lock	M	Demonstrate latch replacement	Replace a latch	
7.5.6	Identify the materials used for weather proofing	I	Discuss weather proofing and materials	Test	
7.5.7	Repair screening	M	Demonstrate screen repair	Repair a screen	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) — Suggested Length

Sub-Unit 7.6 Wall Repair

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.6.1	Identify patching materials	I	Discuss patching materials	Quiz on patching materials	
7.6.2	Patch sheetrock or plaster wall	M	Demonstrate patching procedures	Patch sheetrock	
7.6.3	Repair wall paper	M	Demonstrate wall paper repair	Quiz	
7.6.4	Hang or replace a piece of paneling	M	Discuss replacement	Install paneling	
7.6.5	Identify fasteners used to repair walls	I	Discuss fasteners	Quiz on fasteners	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) — Suggested Length

Sub-Unit 7.7 Roofing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.7.1	List steps in leak detection	I	Discuss leak detection	Quiz	
7.7.2	Identify types of flashing repair	I	Discuss flashing repairs	Quiz on flashing repairs	
7.7.3	Identify methods of chimney repairs	I	Discuss chimney repair	Quiz on chimney repair	
7.7.4	Identify types of sky-light leaks	I	Discuss sky-light	Quiz on sky-light repair	
7.7.5	Identify types of gutter and down spout leaks	I	Discuss gutters and down spouts	Quiz	
7.7.6	Repair asphalt roofing	M	Discuss asphalt roof repair	Quiz on asphalt repair	
7.7.7	Repair a composition roof	M			
7.7.8	Repair a wood shingle roof	M	Demonstrate shingle replacement	Replace shingles	
7.7.9	Replace ceramic tile	M	Demonstrate replacement of tiles	Repair tiles	
7.7.10	Identify types of adhesives	I	Discuss adhesives	Quiz on adhesives	

Type: M - Manipulative I - Informational A - Attitudinal

INSTRUCTIONAL SCHEDULE

Curriculum Area MULTIFIELD LABORATORY — Suggested Length 1 Year

Unit 7 Home Repair (Cont'd) — Suggested Length

Sub-Unit 7.8 Refinishing

No.	Task Description (The student will be able to)	Type	Suggested Instructor Activities	Suggested Student Activities	Suggested Resource Material
7.8.1	Strip a finished object	M	Discuss abrasives	Strip an object	Text: Finishing Technology
7.8.2	Sand an object	M	Discuss sanding techniques	Sand object	
7.8.3	Repair surfaces	M	Discuss surface repairing	Repair a surface	
7.8.4	Prime or seal surfaces	M	Discuss sealers	Seal a surface	
7.8.5	Finish the surface	M	Discuss finishes	Finish surface	

Type: M - Manipulative I - Informational A - Attitudinal

APPENDIX

ORGANIZATION PATTERN FOR MULTIFIELD LABORATORY

	7 WEEKS	7 WEEKS	7 WEEKS	7 WEEKS	6 WEEKS	
ORIENTATION - 1 WEEK	DRAFTING	WOODS	METALS	ELECTRICITY	FREE ENTERPRISE SYSTEM	END OF SCHOOL ACTIVITIES - 1 WEEK
	ELECTRICITY	DRAFTING	WOODS	METALS		
	METALS	ELECTRICITY	DRAFTING	WOODS		
	WOODS	METALS	ELECTRICITY	DRAFTING		

NOTE: The areas included are only examples. Areas can be changed to suit local conditions.

ORGANIZATION PATTERN FOR MULTIFIELD LABORATORY

4 WEEKS	6 WEEKS	6 WEEKS	6 WEEKS	6 WEEKS	6 WEEKS	
ORIENTATION - 1 WEEK	DRAFTING	WOODS	POWER	METALS	ELECTRICITY	FREE ENTERPRISE SYSTEM	END OF SCHOOL ACTIVITIES - 1 WEEK
		ELECTRICITY	WOODS	POWER	METALS		
		METALS	ELECTRICITY	WOODS	POWER		
		POWER	METALS	ELECTRICITY	WOODS		

NOTE: The areas included are only examples. Areas can be changed to suit local conditions.

ORGANIZATION PATTERN FOR MULTIFIELD LABORATORY

	8½ WEEKS	8½ WEEKS	8½ WEEKS	8½ WEEKS	
ORIENTATION - 1 WEEK	DRAFTING	WOODS	METALS	FREE ENTERPRISE SYSTEM	END OF SCHOOL ACTIVITIES - 1 WEEK
	METALS	DRAFTING	WOODS		
	WOODS	METALS	DRAFTING		

NOTE: The areas included are only examples. Areas can be changed to suit local conditions.

ORGANIZATION PATTERN FOR MULTIFIELD LABORATORY

	8½ WEEKS	8½ WEEKS	8½ WEEKS	8½ WEEKS	
ORIENTATION - 1 WEEK	DRAFTING	WOODS	METALS	ELECTRICITY	END OF SCHOOL ACTIVITIES - 1 WEEK
	ELECTRICITY	DRAFTING	WOODS	METALS	
	METALS	ELECTRICITY	DRAFTING	WOODS	
	WOODS	METALS	ELECTRICITY	DRAFTING	

NOTE: The areas included are only examples. Areas can be changed to suit local conditions.